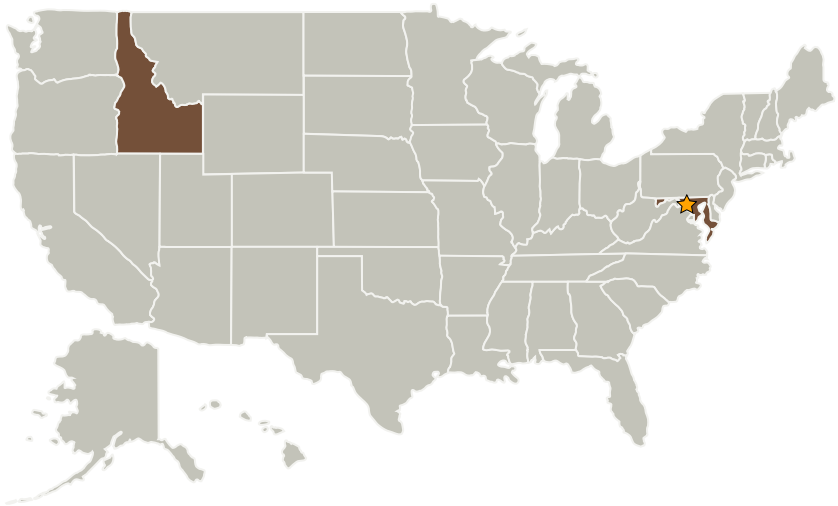
Compiler for Fast, Accurate Mathematical Computing on Integer Processors, Phase I

Completed Technology Project (2007 - 2007)

Project Introduction

The proposers will develop a computer language compiler to enable inexpensive, low-power, integer-only processors to carry our mathematically-intensive comptutations at high speed, with excellent computational accuracy. This will enable space systems designers to select from a wide range of radiation-hard processors for math-intensive command and data handling applications such as spacecraft attitude control, advanced sensing, instrument data processing and calibration, and autonomous operation. Integer-only processors are capable of accurate math-intensive computing if properly programmed using a fixed point computational model. This presents a major challenge to the program designer. Software tools are available to help the programmer analyze fixed point implementations, but not to create them. This kind of trial-and-error design cycle can be expensive, time-consuming and error-prone. Our compiler will analyze system specifications, such as input data ranges and formats, architectural constraints, and a description of the computational algorithm. It will insert data scaling operations into the integer instruction stream to make the most effective use of the internal data representation. The resulting code will be an order of magnitude faster and more compact than a software floating point implementation, with very competitive computational accuracy. This technology will be available for NASA programs immediately after Phase 2.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
EnTempo Corporation	Supporting Organization	Industry	Moscow, Idaho

Primary U.S. Work Locations	
Idaho	Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.4 Information Processing
    - TX11.4.2 Intelligent Data Understanding